Personal Protective Equipment

Protecting Employees from Workplace Hazards

- Employers must protect employees from hazards such as falling objects, harmful substances, and noise exposures that can cause injury
- Employers must:
  - Use all feasible engineering and work practice controls to eliminate and reduce hazards
  - Use personal protective equipment (PPE) if the controls don't eliminate the hazards.
- PPE is the last level of control!

Engineering Controls

If . . .

The work environment can be physically changed to prevent employee exposure to the potential hazard,

Then . . .

The hazard can be eliminated with an engineering control

Engineering Controls

Examples . . .

- **Initial design specifications**
- **Substitute less harmful material**
- **Change process**
- **Enclose process**
- **Isolate process**

Work Practice Controls

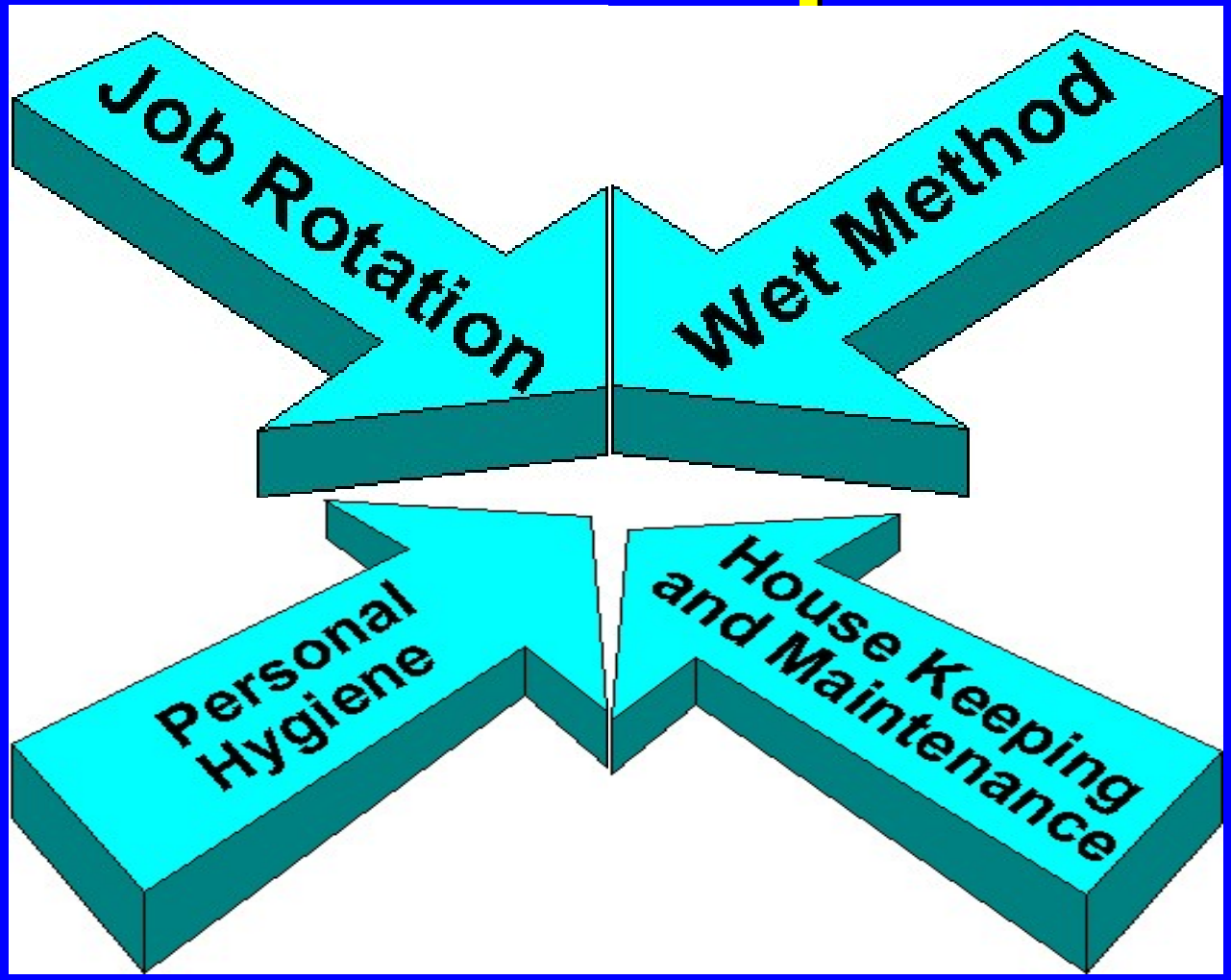
If . . .

Employees can change the way they do their jobs and the exposure to the potential hazard is removed,

Then . . .

The hazard can be eliminated with a work practice control

Work Practice Controls -- Examples



Responsibilities

- **Employer**
  - **Assess workplace for hazards**
  - **Provide PPE**
  - **Determine when to use**
  - **Provide PPE training for employees and instruction in proper use**
- **Employee**
  - **Use PPE in accordance with training received and other instructions**
  - **Inspect daily and maintain in a clean and reliable condition**

Examples of PPE

Body Part	Protection
Eye	safety glasses, goggles
Face	face shields
Head	hard hats
Feet	safety shoes
Hands and arms	gloves
Bodies	vests
Hearing	earplugs, earmuffs

PPE Program

- Includes procedures for selecting, providing and using PPE
- First -- assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of PPE
- After selecting PPE, provide training to employees who are required to use it

Training

If employees are required to use PPE, train them:

- Why it is necessary
- How it will protect them
- What are its limitations
- When and how to wear
- How to identify signs of wear
- How to clean and disinfect
- What is its useful life & how is it disposed

Head Protection

Causes of Head Injuries

- **Falling objects such as tools**
- **Bumping head against objects, such as pipes or beams**
- **Contact with exposed electrical wiring or components**

Selecting the Right Hard Hat

Class A

- General service (building construction, shipbuilding, lumbering)
- Good impact protection but limited voltage protection

Class B

- Electrical / Utility work
- Protects against falling objects and high-voltage shock and burns

Class C

- Designed for comfort, offers limited protection
- Protects against bumps from fixed objects, but does not protect against falling objects or electrical shock

Eye Protection

When must Eye Protection be Provided?

When any of these hazards are present:

- **Dust and other flying particles, such as metal shavings or sawdust**
- **Corrosive gases, vapors, and liquids**
- **Molten metal that may splash**
- **Potentially infectious materials such as blood or hazardous liquid chemicals that may splash**
- **Intense light from welding and lasers**

Eye Protection
Criteria for Selection

- Protects against specific hazard(s)
- Comfortable to wear
- Does not restrict vision or movement
- Durable and easy to clean and disinfect
- Does not interfere with the function of other required PPE

Eye Protection for Employees Who Wear Eyeglasses

Ordinary glasses do *not* provide the required protection

Proper choices include:

- **Prescription glasses with side shields and protective lenses**
- **Goggles that fit comfortably over corrective glasses without disturbing the glasses**
- **Goggles that incorporate corrective lenses mounted behind protective lenses**

Safety Glasses

- Made with metal/plastic safety frames
- Most operations require side shields
- Used for moderate impact from particles produced by jobs such as carpentry, woodworking, grinding, and scaling

Goggles

- **Protects eyes and area around the eyes from impact, dust, and splashes**
- **Some goggles fit over corrective lenses**

Laser (Welding) Safety Goggles

Protects eyes from intense concentrations of light produced by lasers

Face Shields

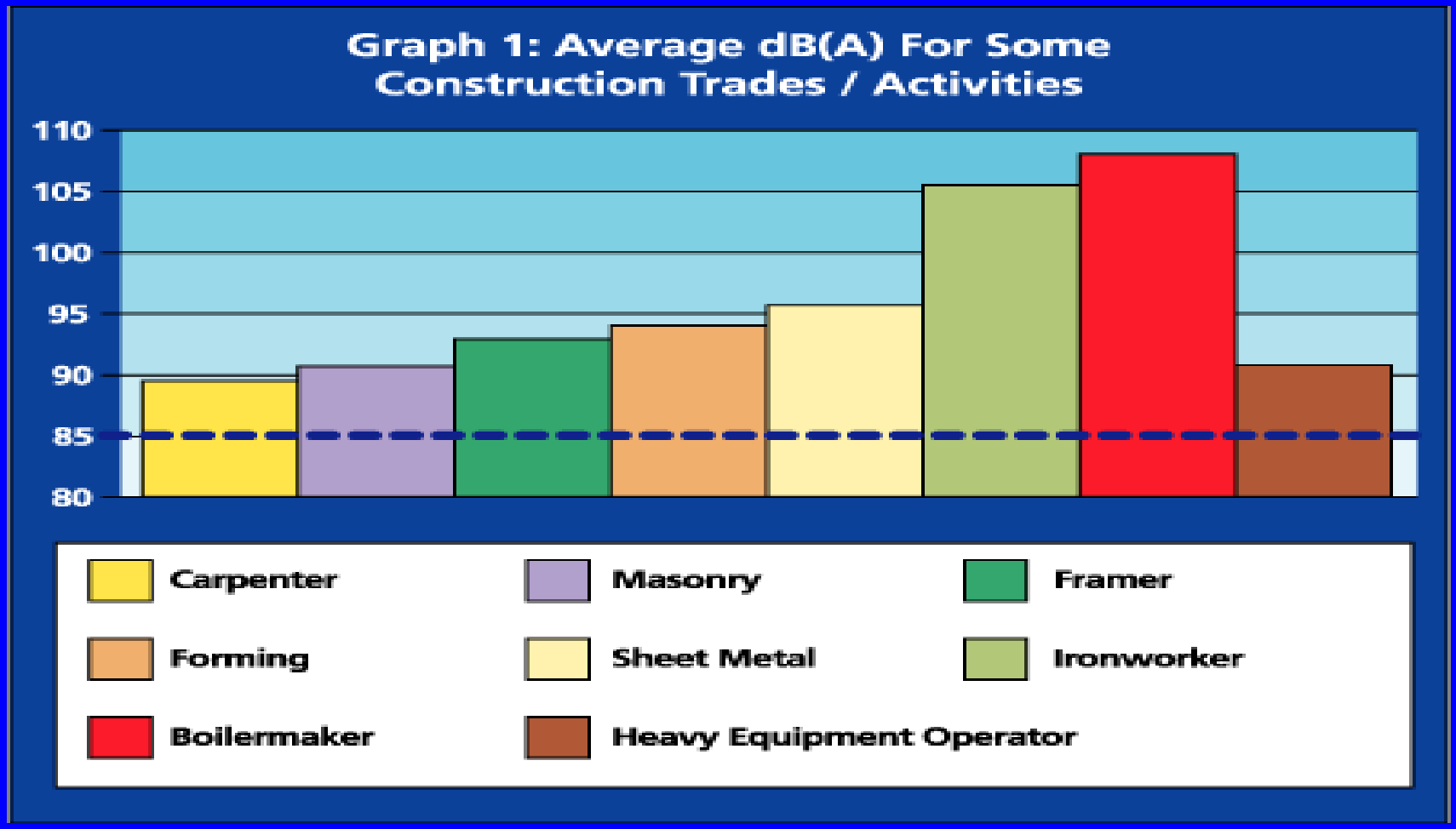
- **Full face protection**
- **Protects face from dusts and splashes or sprays of hazardous liquids**
- **Does not protect from impact hazards**
- **Wear safety glasses or goggles underneath**

Welding Shields

Protects eyes against burns from radiant light

Protects face and eyes from flying sparks, metal spatter, & slag chips produced during welding, brazing, soldering, and

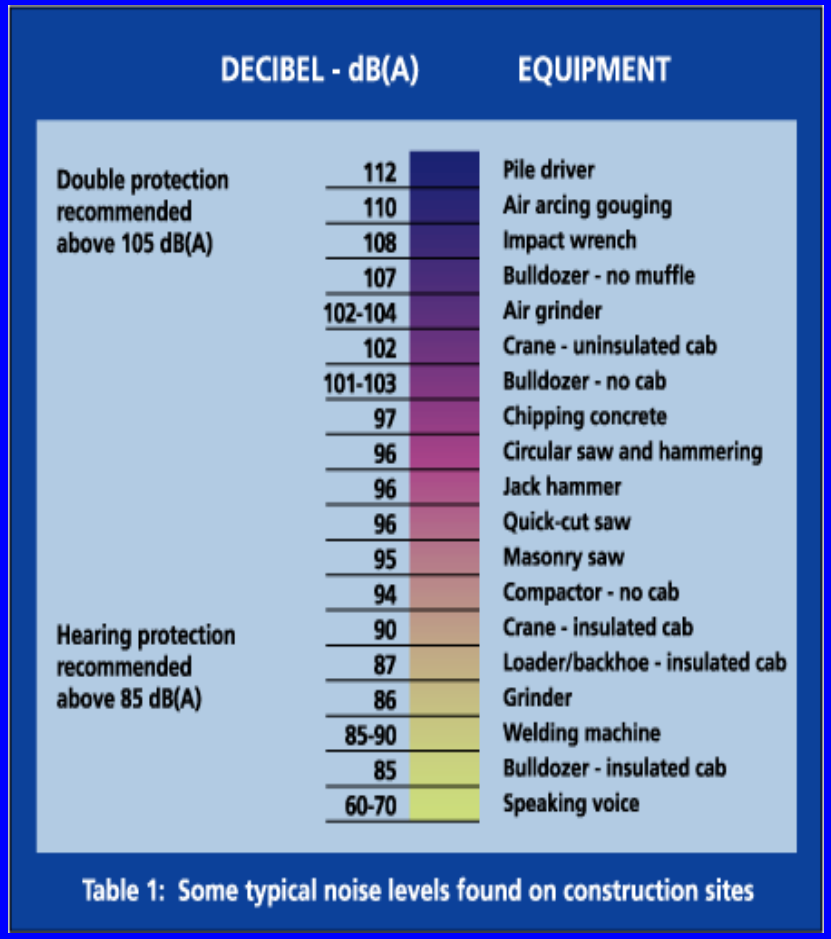
Hearing Protection



Hearing Protection

When it's not feasible to reduce the noise or its duration – use ear protective devices

Ear protective devices must be fitted



	DECIBEL - dB(A)	EQUIPMENT
Double protection recommended above 105 dB(A)	112	Pile driver
	110	Air arcing gouging
	108	Impact wrench
	107	Bulldozer - no muffle
	102-104	Air grinder
	102	Crane - uninsulated cab
	101-103	Bulldozer - no cab
	97	Chipping concrete
	96	Circular saw and hammering
	96	Jack hammer
	96	Quick-cut saw
	95	Masonry saw
	94	Compactor - no cab
Hearing protection recommended above 85 dB(A)	90	Crane - insulated cab
	87	Loader/backhoe - insulated cab
	86	Grinder
	85-90	Welding machine
	85	Bulldozer - insulated cab
	60-70	Speaking voice

Table 1: Some typical noise levels found on construction sites

When Must Hearing Protection be Provided?

After implementing engineering and work practice controls

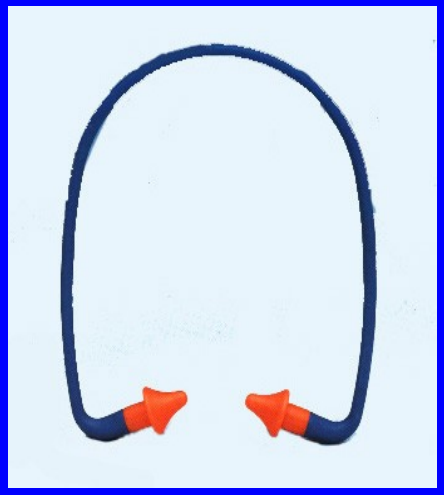
When an employee's noise exposure exceeds an 8-hour time-weighted average (TWA) sound level of 90 dBA

Examples of Hearing Protectors

Earmuffs

Earplugs

Canal Caps



Foot Protection

When Must Foot Protection be Provided?

When any of these are present:

- **Heavy objects such as barrels or tools that might roll onto or fall on employees' feet**
- **Sharp objects such as nails or spikes that might pierce ordinary shoes**
- **Molten metal that might splash on feet**
- **Hot or wet surfaces**
- **Slippery surfaces**

Safety Shoes

- **Impact-resistant toes and heat-resistant soles protect against hot surfaces common in roofing and paving**
- **Some have metal insoles to protect against puncture wounds**
- **May be electrically conductive for use in explosive atmospheres, or nonconductive to protect from workplace electrical hazards**

Hand Protection

When Must Hand Protection be Provided?

When any of these are present:

- **Burns**
- **Bruises**
- **Abrasions**
- **Cuts**
- **Punctures**
- **Fractures**
- **Amputations**
- **Chemical Exposures**

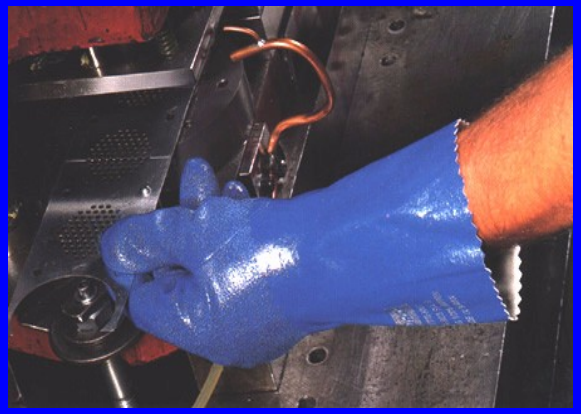
What Kinds of Protective Gloves are Available?

- Durable gloves made of metal mesh, leather, or canvas
  - Protects from cuts, burns, heat
- Fabric and coated fabric gloves
  - Protects from dirt and abrasion
- Chemical and liquid resistant gloves
  - Protects from burns, irritation, and dermatitis
- Rubber gloves
  - Protects from cuts, lacerations, and abrasions

Types of Rubber Gloves

Nitrile **protects against solvents, harsh chemicals, fats and petroleum products and also provides excellent resistance to cuts and abrasions.**

Butyl **provides the highest permeation resistance to gas or water vapors**



Other Types of Gloves

Kevlar **protects against cuts, slashes, and abrasion**

Stainless steel mesh **protects against cuts and lacerations**

Body Protection

Major Causes of Body Injuries

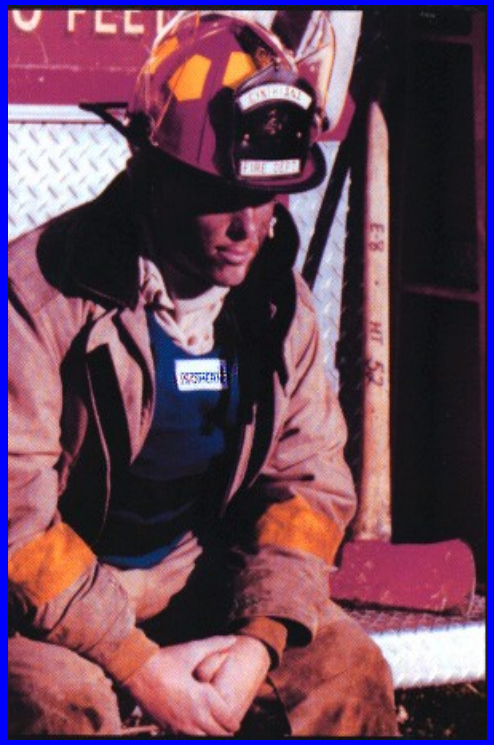
- Intense heat
- Splashes of hot metals and other hot liquids
- Impacts from tools, machinery, and materials
- Cuts
- Hazardous chemicals
- Radiation

Body Protection
Criteria for Selection

- Provide protective clothing for parts of the body exposed to possible injury
- Types of body protectio
  - Vests
  - Aprons
  - Jackets
  - Coveralls
  - Full body suits

Coveralls

Body Protection



Cooling Vest

Full Body Suit

Sleeves and Apron

Summary

Employers must implement a PPE program where they:

- **Assess the workplace for hazards**
- **Use engineering and work practice controls to eliminate or reduce hazards before using PPE**
- **Select appropriate PPE to protect employees from hazards that cannot be eliminated**
- **Inform employees why the PPE is necessary, how and when it must be worn**
- **Train employees how to use and care for their PPE, including how to recognize deterioration and failure**
- **Require employees to wear selected PPE**